

## Kissinger, Lon

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**From:** Shephard, Burt  
**Sent:** Friday, October 23, 2015 4:41 PM  
**To:** Frank Gobas  
**Cc:** Kissinger, Lon  
**Subject:** RE: Columbia River basin specific migration times and lipid content changes for chinook and sockeye salmon

Hi Frank,

As the lipid content changes and mean swimming speeds extrapolated to time spent on the spawning runs are from different studies, best I can tell you is to assume that the reduction in lipid content takes place over the entire spawning run duration: 80 days for the sockeyes and between 26 and 60 days for the chinooks, depending on where the chinooks spawn within Idaho. All of these estimates are based on average swimming speeds measured in Columbia River basin sockeye and chinook, although not necessarily measured on the entire spawning run from the mouth of the Columbia to spawning grounds in Idaho. Realistically, of course, the changes in lipid content are not a steady decline, but vary depending on current, and the presence of rapids or resting areas, and the time and energy expended in each.

The Brett 1995 citation is a chapter from a book from UBC Press, so I suspect you won't have much trouble finding it:

Brett, J.R. 1995. Energetics. Chapter 1, p. 3 - 68 in Groot, C., L. Margolis and W.C. Clarke. Physiological Ecology of Pacific Salmon. UBC Press, University of British Columbia, Vancouver, BC. 510 pp. ISBN 0-7748-0479-3

Let me know if you have any more questions.

Best regards,

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"Facts are stubborn things, but statistics are more pliable"

- Mark Twain

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**From:** Frank Gobas [mailto:gobas@sfu.ca]  
**Sent:** Friday, October 23, 2015 2:32 PM  
**To:** Shephard, Burt  
**Cc:** Kissinger, Lon  
**Subject:** Re: Columbia River basin specific migration times and lipid content changes for chinook and sockeye salmon

Hi Burt

Thanks a lot for the data.

So far, we have just one question:

Re. the change in lipid content throughout the migration, e.g. from 16.5 to 2.6%, what was the time period over which this occurred.

Do you also have the Brett 1995 reference for us. We may find the info in there.

Thanks

Frank

On Oct 22, 2015, at 3:14 PM, Shephard, Burt <[Shephard.Burt@epa.gov](mailto:Shephard.Burt@epa.gov)> wrote:

<image001.gif>

Frank,

Attached are two spreadsheets. The first gives information on the duration of spawning runs for chinook and sockeye salmon. Chinooks spawn and are caught in a number of different locations in Idaho, thus there is a range of distances migrated, which converts into a range of potential exposure durations to contaminants in water. Lipid content data was harder to come by, but there is some Columbia River basin specific information for the two species. The duration data are in one tab, the lipid contents, as well as an estimate of the percent of lipid lost per day of migration are on a second tab. I also have protein content changes during the spawning run for chinooks, but not for sockeyes. Finally, there is some average body weight data available for the start of the spawning run for both species, and average weight data for sockeye during their actual spawning. I haven't calculated % weight lost per day for the sockeyes, the original data are apparently quite noisy.

Finally, I've amended the FWM spreadsheet you sent us the other day with EPA's 2015 national human health water quality criteria for those chemicals where we have a criterion. They are added in column A of your spreadsheet, and represent the water + organism EPA criteria for water, in units of µg/L. I believe the human health criteria are total concentrations in water, not freely dissolved concentrations, Lon can correct me if I'm wrong.

Best regards,

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<Chinook and sockeye exposure durations to Idaho.xlsx><WQG Model for Migrating Fish-fg2 BKS  
HHWQC added 102115.xlsx>